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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/705,274	11/03/2000	Misbahul Azam	ONS00114	4443

7590 10/15/2002  
Robert D Atkins  
Semicinductor Components Industries LLC  
Patent Administration Dept MD A230  
P O Box 62890  
Phoenix, AZ 85082-2890

EXAMINER

NGUYEN, KHIEM D

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 10/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Advisory Action**

Application No.

09/705,274

Applicant(s)

AZAM ET AL.

Examiner

Khiem D Nguyen

Art Unit

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--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 17 September 2002 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE. Therefore, further action by the applicant is required to avoid abandonment of this application. A proper reply to a final rejection under 37 CFR 1.113 may only be either: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114.

**PERIOD FOR REPLY** [check either a) or b)]

- a) ☐ The period for reply expires \_\_\_\_\_ months from the mailing date of the final rejection.  
 b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.  
 ONLY CHECK THIS BOX WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

1. ☐ A Notice of Appeal was filed on \_\_\_\_\_. Appellant's Brief must be filed within the period set forth in 37 CFR 1.192(a), or any extension thereof (37 CFR 1.191(d)), to avoid dismissal of the appeal.  
 2. ☐ The proposed amendment(s) will not be entered because:  
 (a) ☐ they raise new issues that would require further consideration and/or search (see NOTE below);  
 (b) ☐ they raise the issue of new matter (see Note below);  
 (c) ☐ they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or  
 (d) ☐ they present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: \_\_\_\_\_

3. ☐ Applicant's reply has overcome the following rejection(s): \_\_\_\_\_.  
 4. ☐ Newly proposed or amended claim(s) \_\_\_\_\_ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).  
 5. ☒ The a) ☐ affidavit, b) ☐ exhibit, or c) ☒ request for reconsideration has been considered but does NOT place the application in condition for allowance because: see office action.  
 6. ☐ The affidavit or exhibit will NOT be considered because it is not directed SOLELY to issues which were newly raised by the Examiner in the final rejection.  
 7. ☒ For purposes of Appeal, the proposed amendment(s) a) ☐ will not be entered or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.

The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: \_\_\_\_\_

Claim(s) objected to: \_\_\_\_\_

Claim(s) rejected: 1-25

Claim(s) withdrawn from consideration: \_\_\_\_\_

8. ☐ The proposed drawing correction filed on \_\_\_\_\_ is a) ☐ approved or b) ☐ disapproved by the Examiner.  
 9. ☐ Note the attached Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_.  
 10. ☒ Other: see office action

## DETAILED ACTION

### *Response to Amendment after final or Advisory Action*

1. Applicant's arguments filed 9/17/2002 have been fully considered but they are not persuasive.

### *Status of the amendment after final rejection*

2. No claims were amended after Final Rejection.

### *Status of the pending claims after final rejection*

3. The finally rejected claims are 1-25.

### *Status of the Pending Rejections or Objections*

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Madson in combination with Williams et al (U.S. Patent No. 6,291,298).

Madson discloses in figures 1-12 and related text a method of forming a trench in a semiconductor device, comprising:

providing a substrate (figure 8A, 800) for the semiconductor device;

forming a first epitaxial layer (figure 8A, 802) on the substrate;

disposing a masking material (figure 8A, 804) on the substrate and first epitaxial layer, wherein the masking layer is from a group consisting of silicon dioxide and silicon nitride (paragraph [0055]);

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forming a mask (paragraph [0056]) at the location of the trench after disposing the masking material;

forming a protruding portion (figure 8B, 806) at a location of the trench by forming an opening in the masking material adjacent to the location of the trench, wherein forming the protruding portion further includes performing an etch step to remove the masking material where the mask is absent to form the opening (paragraph [0056]);

depositing an epitaxial material comprising silicon to fill in the openings (figure 8C, 808), wherein depositing the epitaxial material includes using a selective epitaxial growth process to fill the openings (paragraph [0057]);

removing the protruding portion to form the trench (figure 8D, 810) within the second epitaxial layer aligned with the major surface of the first epitaxial layer of the semiconductor device (paragraph [0058]);

depositing a gate structure (figure 10H, 28) within the trench to form the semiconductor device.

Madson fails to disclose etching the semiconductor material to round off comers of the trench as recited by the newly amended claims. Williams et al disclose in figures 1-42C and related text a method of etching the bottom corners of a trench (figures 8a-8c). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Williams with the method of Madson in order to help reduce the strength of the electrical field near the bottom of the trench (col. 6, lines 1-10).

*Response to Arguments*

In response to applicant's argument that the combination of the Madson and Williams references do not show or teach a method of forming a trench in a semiconductor device, comprising, among other things, forming a protruding portion in a masking material, depositing a semiconductor material, removing the protruding portion to form the trench, and etching the semiconductor material to round off corners of the trench as does the applicant.

Examiner disagreed. Madson (U.S. Pub. '167) teaches forming a protruding portion (figure 8B, 806) at a location of the trench by forming an opening in the masking material adjacent to the location of the trench, wherein forming the protruding portion further includes performing an etch step to remove the masking material where the mask is absent to form the opening (paragraph [0056]; and,

removing the protruding portion to form the trench (figure 8D, 810) within the second epitaxial layer aligned with the major surface of the first epitaxial layer of the semiconductor device (paragraph [0058]);

Even though Madson fails to disclose etching the semiconductor material to round off corners of the trench. Williams (U.S. '298) discloses in figures 8A-8C and related text a method of forming a trench with rounded corners by etching the silicon through an opening in a mask. See col. 5, lines 14-35.

Further, the applicant argued that there would be no motivation to combine the Madson and Williams references. However, in the Office Action mailed on 7-17-2002, the examiner stated that it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Williams with the method of

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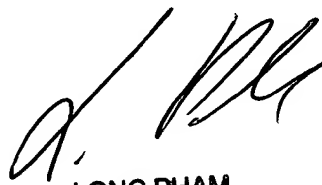
Madson in order to help reduce the strength of the electrical field near the bottom of the trench (col. 6, lines 1-10).

*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (703) 306-0210. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-9179 for regular communications and (703) 746-9179 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



LONG PHAM  
PRIMARY EXAMINER

K.N.  
October 7, 2002